



Technical catalogue
ACTIVE HARMONIC FILTER



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Contents

Product features	2
Common symptoms due to poor power quality	
Causes of electrical harmonics	3
Benefits of using an Active Harmonic Filter	
AHF operating principle	4
Application	6
Description of the model	
Technical specifications	7
Dimension and structure	8
Product Advantages	10

Introduction

BTB ELECTRIC Company is a European standard electrical equipment manufacturer. We provide solutions to improve power quality, products include Capacitors, Harmonic Filter Reactors, Power Factor Controllers, Active harmonic filters, Intelligent combined low voltage power capacitor.

BTB Electric's AHF harmonic filter improves power supply quality and equipment operation reliability, while reducing economic loss caused by the equipment problem.

BTB Electric carries out production in strict accordance with the ISO9001 quality management system.

Product features

Reduce the heating of electrical equipment, reduce insulation aging, increase service life and reduce maintenance costs.

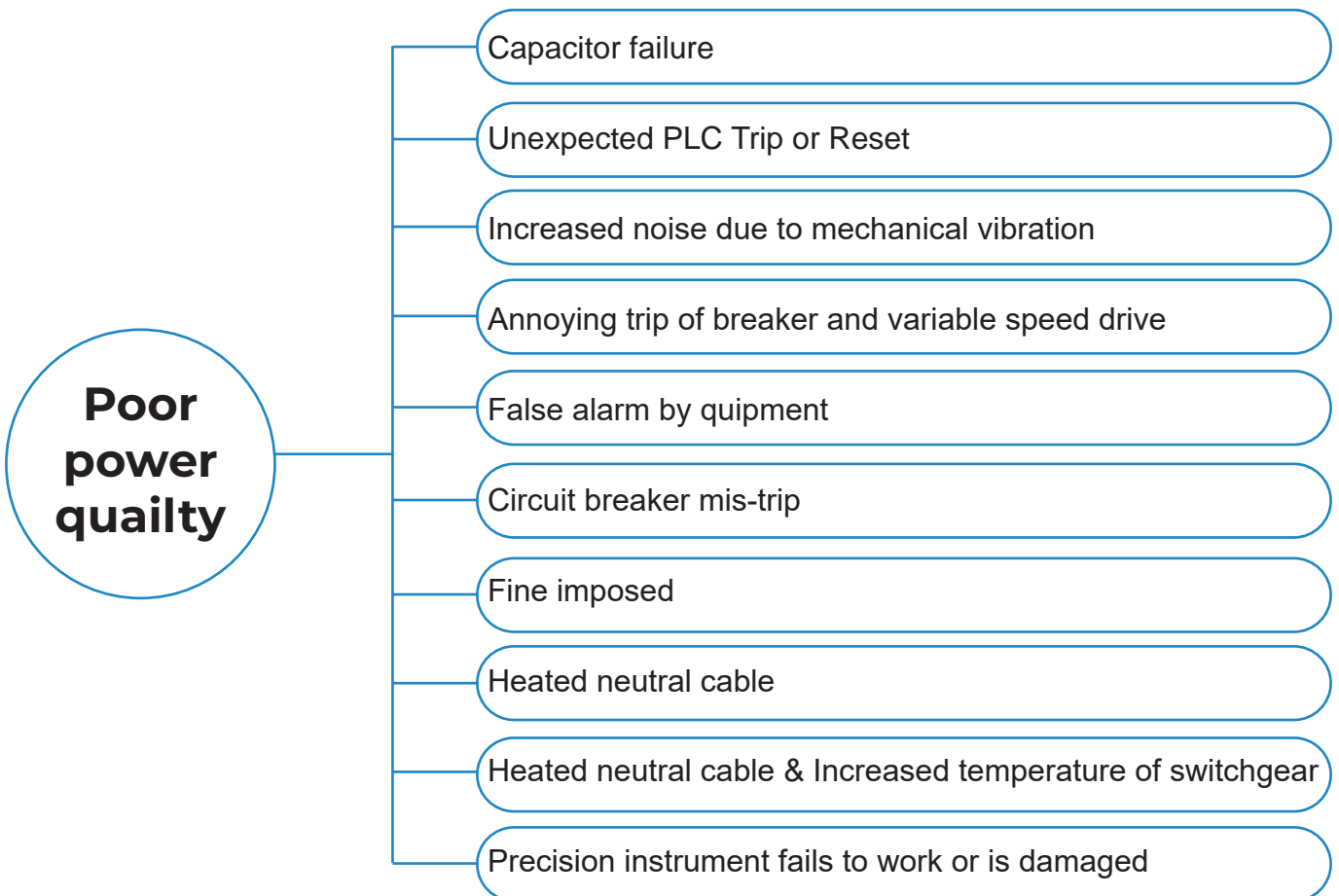
Reduce the resonance probability of the compensation capacitors in the power grid, improve the safety of electricity consumption. Reduce the influence of harmonics on the system signal transmission and increase the reliability of the system; Reduce the heating of equipment such as motors and reduce the data error rate of computer systems.

Reduce electromagnetic interference caused by harmonics, and ensure the normal operation of weak current systems.

AHF can filter 2 ~ 50 times harmonics at the same time, or set the compensation times of harmonic current and the compensation rate of each harmonic as required.

Common symptoms due to poor power quality

Below are typical harmful effects due to poor electricity quality.

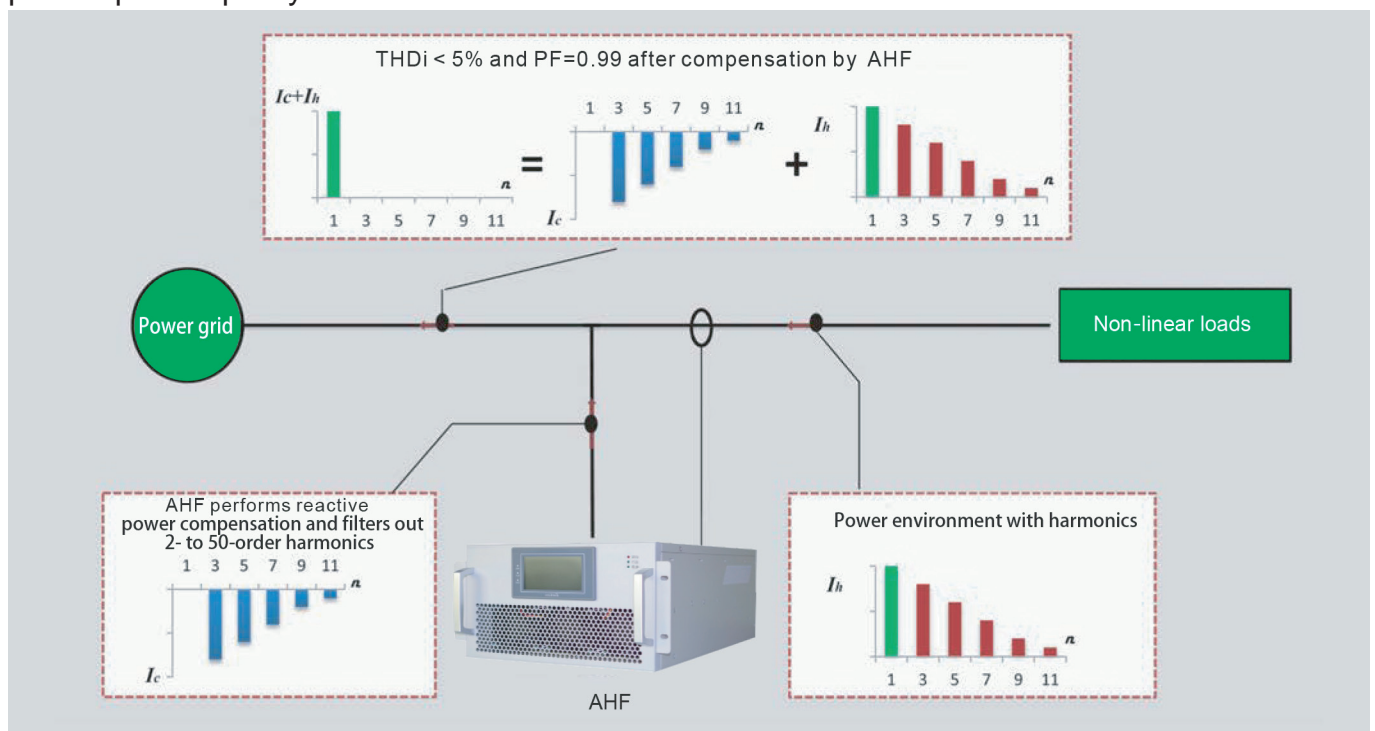


Causes of electrical harmonics

In an industrial environment, the causes of harmonic distortion are most often the electrical equipment in an operation. Modern industrial plants contain many pieces of equipment that may contribute to the overall distortion—a few obvious examples include variable frequency drives and electrical motors driven by inverters. These drives take in the regular AC voltage and current and convert that into DC and then create a variable frequency output so that the motors can be controlled more precisely. When the current is drawn into the inverter it is not taken as a pure sinewave but takes current irregularly to charge the components that are on the front end of the inverter. This irregular current draw distorts the current and, consequently, the voltage. These inverters may be used to drive motors that are part of the industrial process such as pumping cooling or heating water, liquid materials, moving conveyors, or cooling fans. Other types of electronic controls will also be part of the process, and each one will create some distortion. When all this equipment is connected on the same network, the distortion will increase overall.

Benefits of using an Active Harmonic Filter (AHF)

AHF connected in parallel to the low-voltage side of the power grid to improve the power quality. Featuring smart control, high efficiency, rapid dynamic response, and stable and reliable operation, they eliminate the complicated power quality problems and make it possible to achieve perfect power quality.

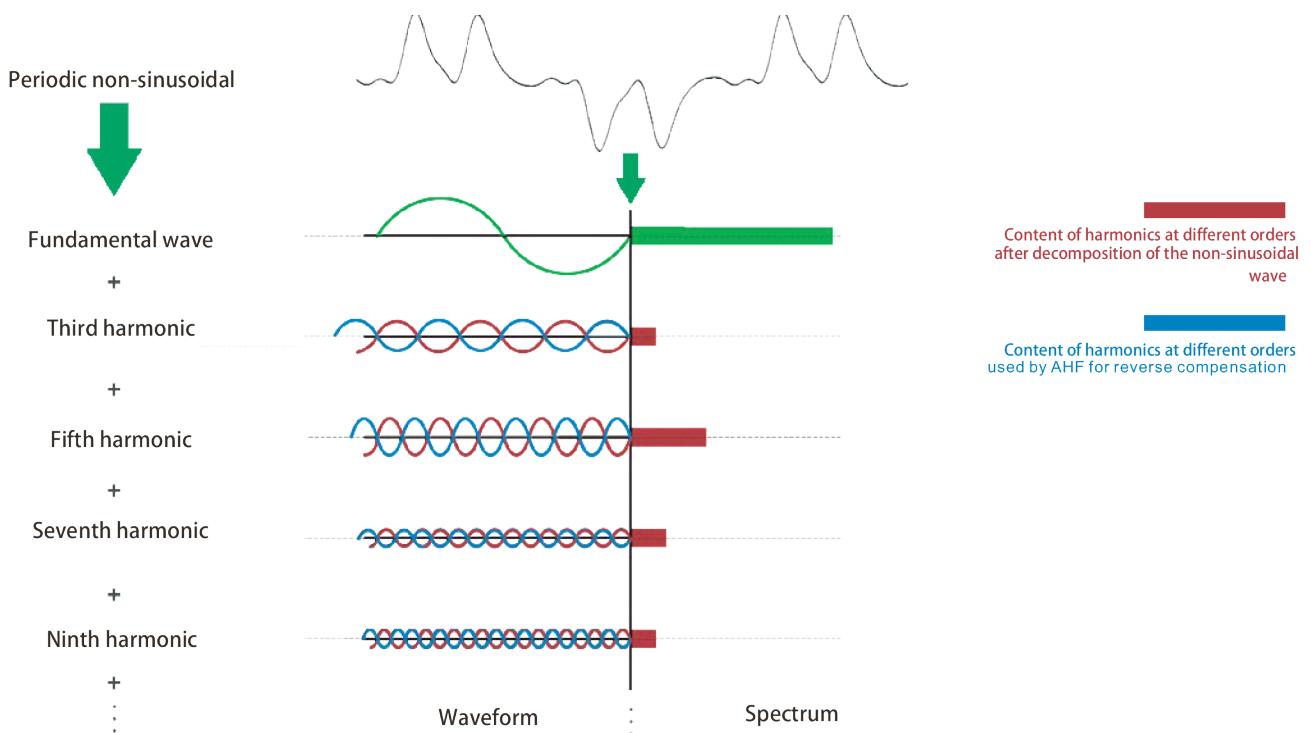
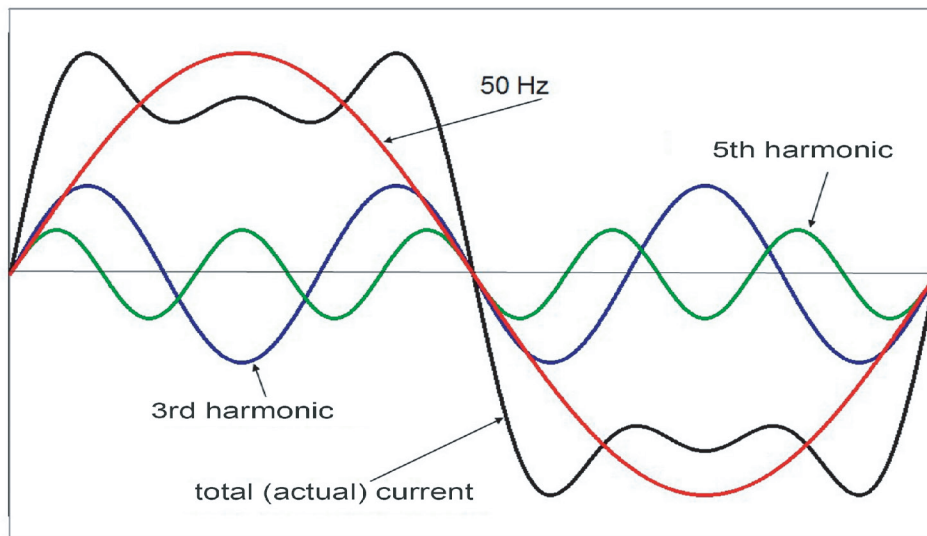


- Improve the power supply quality and reliability of enterprises' equipment, and reduce economic loss due to mal-operation of the equipment.
- Reduce the heating of power equipment and aging of insulation, thereby increasing the service life and reducing the maintenance cost of the equipment.
- Lower the harmonic probability of compensation capacitor, thereby improving the security of power consumption. Moreover, reduce the impact of harmonics on system signals, thereby improving the system reliability.
- Reduce the heating of equipment such as motors and the data error rate of the computer system. Reduce electromagnetic interference generated by harmonics, thereby ensuring normal operation of the weak-current system.
- Meets international and local standards.

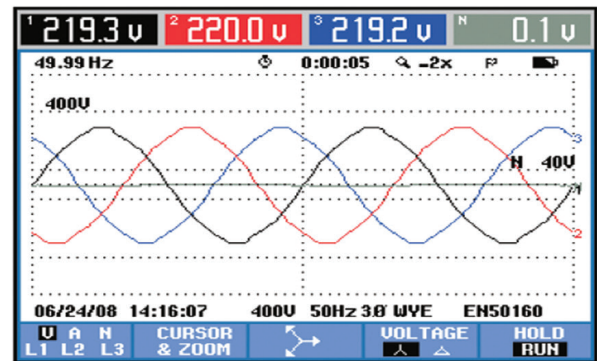
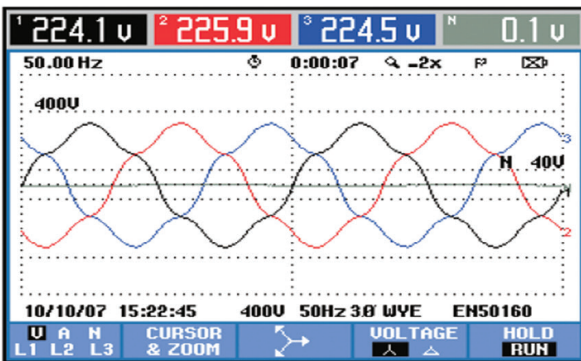
AHF operating principle

AHF checks the load current in real time through the external CT, performs computing through the internal DSP, and then extracts the harmonic components of the load current. After that, it sends the harmonic components to the internal IGBT through PWM signals to control the inverter to generate a current with a power equal to that of the harmonic and a direction reverse to that of the harmonic. Then, it injects the current into the compensation harmonic current to implement the filtering function.

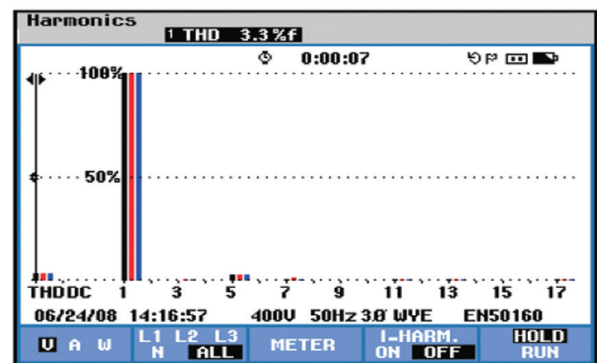
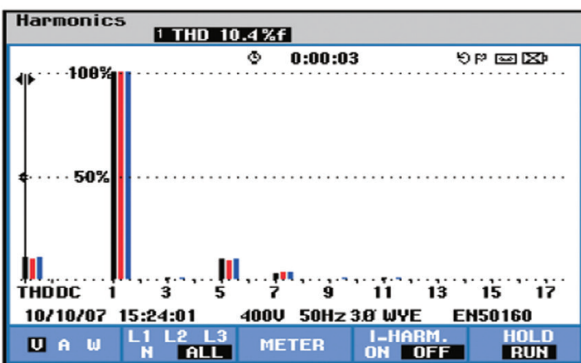
Current at individual harmonic orders superposed onto the fundamental current to form nonsinusoidal waveform.



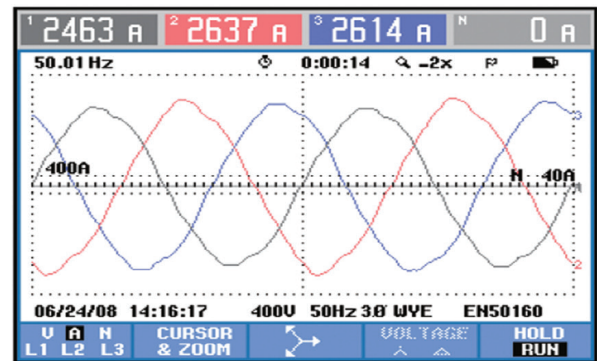
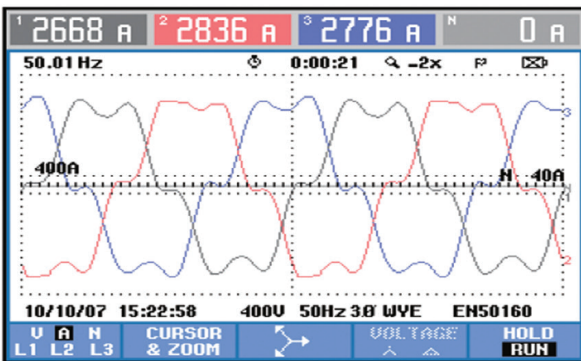
Examples:



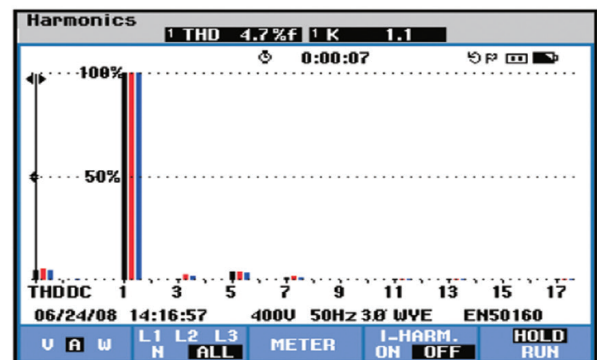
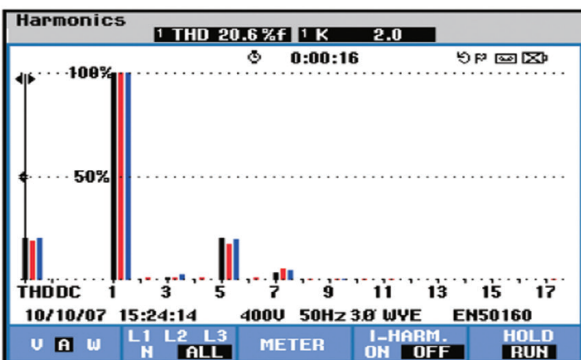
Waveforms and RMS values of phase currents before and after AHF were installed



Harmonic spectrum of phase currents before and after AHF were installed



Waveforms and RMS values of phase voltages before and after AHF were installed



Harmonic spectrum of phase voltages before and after AHF were installed

Application



Automotive manufacturing



IDC industry



Hospital



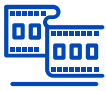
Modern architecture



Sewage treatment



Power generation



Theater



Photovoltaic



Oil exploitation



Semiconductor



Distribution network transformer



Car charging pile



Theme parks and hotels



Smelting steel



Papermaking



Subway



Rubber

Description of the model

BAHF-100-4-4L/D

B	F3	XXX	4	4L	D
1	2	3	4	5	6

No.	Name	Meaning
1	Enterprise code	B: BTB Electric
2	Product type	F3: Active Harmonic Filter version 3
3	Capacity	50/75/100/150/200~600A
4	Voltage level	4: (400V), 6: (690V)
5	Wiring type	4L: (3P4W), 3L: (3P3W)
6	Mounting type	D: Drawer type, W: Wall-mounted type, C: Cabinet type

Product code	Product Description
BF3 - 050 - 4 - 4L/D(W)	AHF 50A, 3P4W, 400V, drawer/wall mounted
BF3 - 075 - 4 - 4L/D (W)	AHF 75A, 3P4W, 400V, drawer/wall mounted
BF3 - 100 - 4 - 4L/D (W)	AHF 100A, 3P4W, 400V, drawer/wall mounted
BF3 - 150 - 4 - 4L/D (W)	AHF 150A, 3P4W, 400V, drawer/wall mounted
BF3 - 200 - 4 - 4L/C	AHF 200A, 3P4W, 400V, cabinet type
BF3 - 250 - 4 - 4L/C	AHF 250A, 3P4W, 400V, cabinet type
BF3 - 300 - 4 - 4L/C	AHF 300A, 3P4W, 400V, cabinet type
BF3 - 350 - 4 - 4L/C	AHF 350A, 3P4W, 400V, cabinet type
BF3 - 400 - 4 - 4L/C	AHF 400A, 3P4W, 400V, cabinet type
BF3 - 500 - 4 - 4L/C	AHF 500A, 3P4W, 400V, cabinet type
BF3 - 600 - 4 - 4L/C	AHF 600A, 3P4W, 400V, cabinet type
BF3 - 050 - 6 - 4L/D(W)	AHF 50A, 3P4W, 690V, drawer/wall mounted
BF3 - 075 - 6 - 4L/D(W)	AHF 75A, 3P4W, 690V, drawer/wall mounted
BF3 - 100 - 6 - 4L/D(W)	AHF 100A, 3P4W, 690V, drawer/wall mounted
BF3 - 150 - 6 - 4L/D(W)	AHF 150A, 3P4W, 690V, drawer/wall mounted

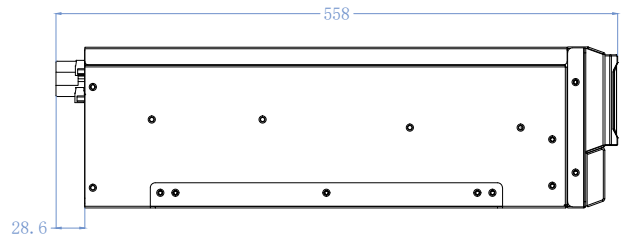
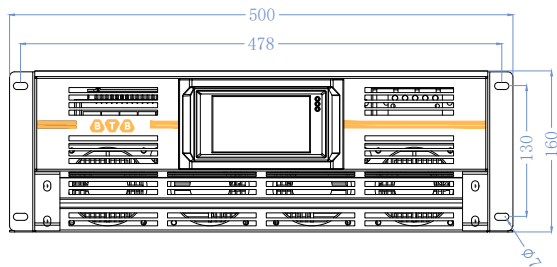
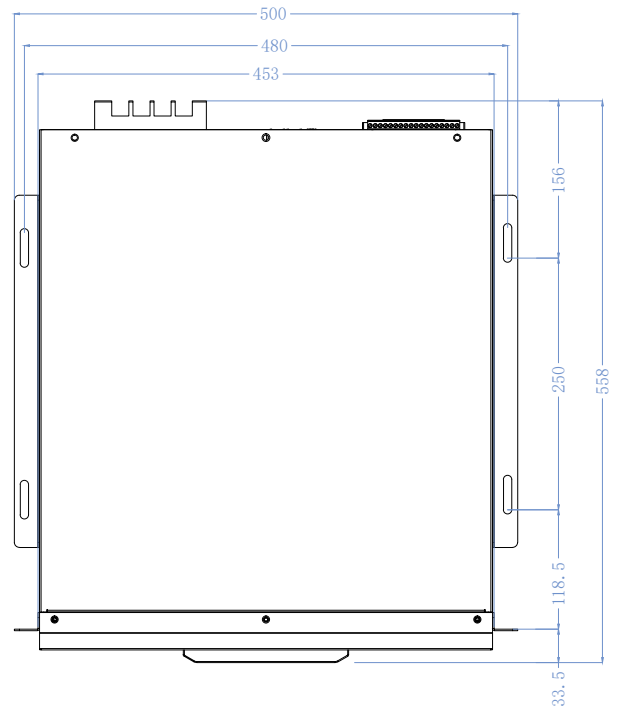
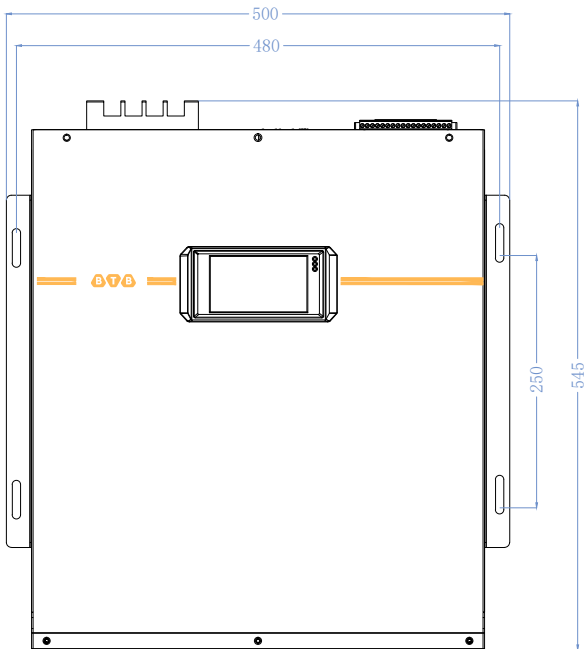
Technical specifications

General characteristics	
Standards	JB/T 11067-2011, DL/T 1216-2013 IEC/EN 60439-1, 2014/30/EU, EN 61000-6
Rated input line voltage	380V \pm 20%
Frequency (fn)	50Hz \pm 10%
Compensation current	50A, 75A, 100A, 150A per module 200A, 300A, 400A, 450A, 500A, 600A per cabinet
Power grid structure	3P3W / 3P4W
Performance specifications	
Operating mode	Active harmonic filtering / Power factor correction / Load balancing
Compensation efficiency	\geq 97%
Harmonic spectrum	2nd to 50th harmonics
Harmonic compensation selection	2nd to 50th harmonics all can be selected individually
Response time	Instantaneous response time < 0.1ms Full response time < 10ms
Power factor correction	Power factor programmable from 1 (inductive) to -1 (capacitive)
Load balancing	Programmable load balancing between phases
Protections	Over-voltage protection, under-voltage protection, short-circuit protection, over-current protection, over-temperature protection, drive fault protection
Operation configuration	
Parallel operation	Up to 8 modules (different rated currents capable)
CT requirements	3 CTs required (100/5A ~ 5000/5A, class 0.5)
Circuit topology	Three-level
Power loss	Less than 3% of rated power
Communication monitoring capability	
Communication interface	RS485, CAN interface
Communication protocol	Modbus protocol
Module display interface	LCD multi-function touch color screen (optional)
Error alarm	Support independent monitoring or centralized monitoring
Environmental conditions	
Operation temperature	-10 ~ 40°C (higher operation temperature allowed with derating)
Humidity	\leq 95% non-condensation
Altitude	\leq 1500m, 1500~3000m (derating 1% per 100m)
Environmental conditions	No harmful gas and steam, no conductive or explosive dust, no severe mechanical vibration
Intelligent air cooling	Excellent ventilation
Protection class	IP20 (higher protection class available on request)
Noise level	Below 65db

Dimension and structure

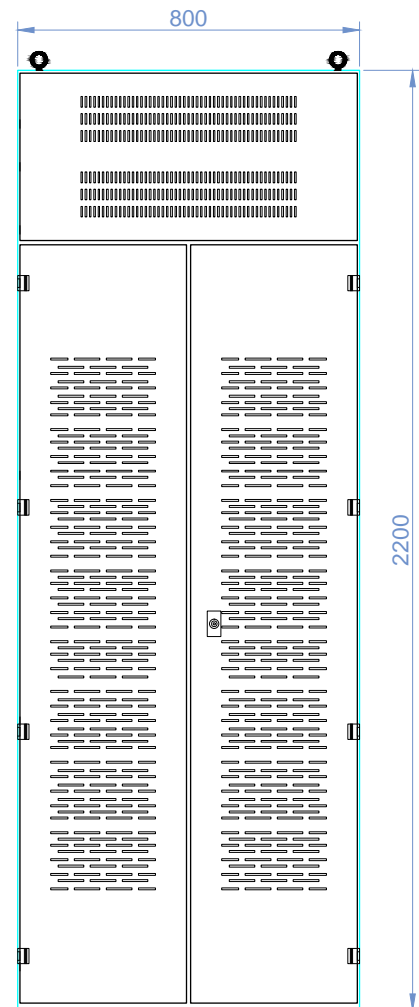
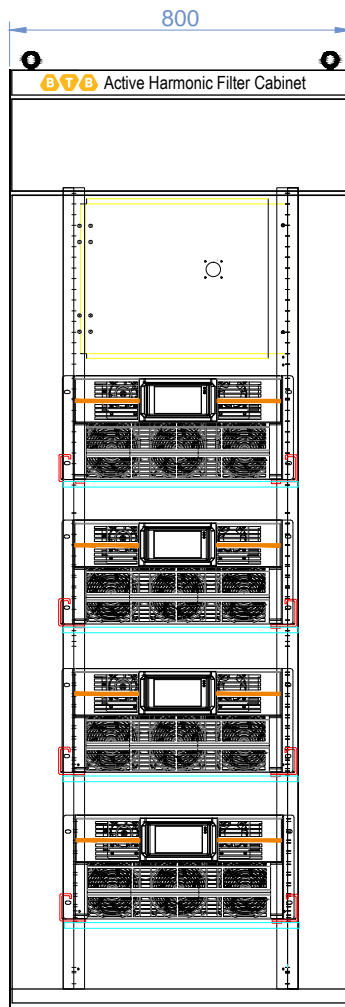
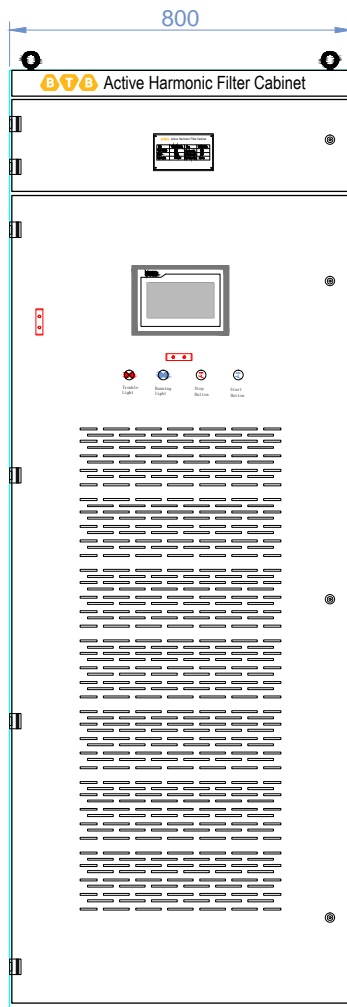
1. Drawer type and wall-mounted type

Code	Dimension (W×H×D) mm		Mounting dimension (W×H) mm	
	Drawer type	Wall-mounted type	Drawer type	Wall mounted type
BF3 - 050 - 4 - 4L/D(W)	500×160×558	500×545×173	478×130 480×250	480×250
BF3 - 075 - 4 - 4L/D(W)	500×160×558	500×545×173	478×130 480×250	480×250
BF3 - 100 - 4 - 4L/D(W)	555×260×665	555×665x260	530×150 535x350	535×350
BF3 - 150 - 4 - 4L/D(W)	555×260×665	555×665x260	530×150 535x350	535×350



2. Cabinet type

Code	Configuration	Dimension (W×H×D) mm
BF3 - 200 - 4 - 4L/C	2 modules	800x2200x800
BF3 - 250 - 4 - 4L/C	2 modules	
BF3 - 300 - 4 - 4L/C	2 modules or 3 modules	
BF3 - 350 - 4 - 4L/C	3 modules	
BF3 - 400 - 4 - 4L/C	3 modules or 4 modules	
BF3 - 450 - 4 - 4L/C	3 modules or 4 modules	
BF3 - 500 - 4 - 4L/C	4 modules	
BF3 - 600 - 4 - 4L/C	4 modules	



Product Advantages

- Harmonic compensation: AHF can filter 2 ~ 50 times random harmonics at the same time
- Reactive power compensation: Capacitive & Inductive (-1 ~ 1) stepless compensation
- Fast response
- Design life is more than 100,000 hours (more than ten years)



Extremely high reliability

Three-level technology platform, excellent air duct design, flexible grid-connected technology, early warning monitoring function, maximum system reliability



Dynamic compensation mode

Flexible setting for harmonic compensation, harmonic & reactive compensation, harmonic & three-phase unbalanced hybrid compensation mode according to application conditions



High efficiency, high power density

97% system efficiency, the industry's highest power density, reducing system investment costs and operating costs



Easy to expand and maintain

Modular expansion and maintenance, maintenance time less than 15min, maximum continuity of operation



Smart communication is easy to use

With WIFI, GPRS communication method is convenient for collecting data and checking data

Select capacity according to transformer capacity and harmonic contamination level

Transformer capacity/KVA	THDI distortion rate					
	15%	20%	25%	30%	35%	40%
200	50A	50A	100A	100A	100A	100A
250	50A	100A	100A	100A	150A	150A
315	100A	100A	150A	150A	150A	200A
400	100A	150A	150A	200A	200A	250A
500	100A	150A	200A	200A	250A	300A
630	150A	200A	250A	300A	350A	400A
800	200A	250A	300A	350A	450A	500A
1000	200A	300A	400A	450A	550A	600A
1250	300A	350A	450A	550A	650A	750A
1600	350A	500A	600A	700A	850A	950A
2000	450A	600A	750A	900A	1050A	1200A
2500	550A	750A	900A	1150A	1300A	1500A

NOTE: This list just reference

AHF capacity go from 80% load of transformet capacity

Initial default settings

The parameter settings are described as follows:

Module parameter setting			
No.	Parameter item	Parameter setting	Remarks
1	Startup mode	Communication start <input type="checkbox"/> Button start <input type="checkbox"/> Auto start <input type="checkbox"/> Load rate self starting <input type="checkbox"/>	
2	Local address setting	1	default
3	Compensation mode	Full compensation <input type="checkbox"/> Compensation by harmonic order <input type="checkbox"/>	
4	Harmonic current compensation capacity	A	
5	Harmonic order	2 ~ 50	
6	Reactive power compensation function	On <input type="checkbox"/> Off <input type="checkbox"/>	
7	Reactive current compensation capacity	A	
8	Unbalance compensation function	On <input type="checkbox"/> Off <input type="checkbox"/>	
9	Unbalance compensation capacity	A	
10	Local mode	Single module <input type="checkbox"/> Multi - module <input type="checkbox"/> Single module+capacitor <input type="checkbox"/>	
11	External CT location	Load side <input type="checkbox"/> Grid side <input type="checkbox"/>	
12	External CT ratio	/5	
13	Internal CT location	Single module <input type="checkbox"/> Multi - module <input type="checkbox"/> Single module+capacitor <input type="checkbox"/>	
14	Internal CT ratio	/5	
15	Phase sequence adaptation	On <input type="checkbox"/> Off <input type="checkbox"/>	
16	Save	After the parameter setting is completed, enter the parameter saving interface and select to save the parameter	



**REALVALUE
FOR LIFE**

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